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October 13, 2011

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State Water Resources Control Board  
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**Re: Climate Change Considerations for Bay-Delta Substitute Environmental Document**

Dear Members of the Board:

The 2006 Bay-Delta Plan identified climate change as an emerging issue. According to the 2006 Bay-Delta Plan:

"A growing body of information suggests that climate change could result in: (1) sea level rise that would adversely impact levees, water quality, and conveyance of water supplies through the Delta; (2) decreased snowmelt in the Sierra Nevada that would reduce effectiveness of existing water storage facilities; (3) increased rainfall that could exacerbate flooding; and (4) adverse biological effects from changes in flow and water quality."

The 2006 Bay-Delta Plan goes on to state that "Water quality control planning must begin to address these possible effects." The Bay-Delta Plan is no exception. The impacts of climate change must be a consideration in developing the project setting and project alternatives for the substitute environmental document.

Recently, the United States Bureau of Reclamation ("USBR") released the attached report, *SECURE Water Act Section 9503(c) – Reclamation Climate Change and Water 2011* ("Report").<sup>1</sup> USBR released the report pursuant to the SECURE Water Act ("SWA"), passed into law on March 30, 2009. (Omnibus Public Land Management Act of 2009 (Public Law 111-11) Subtitle F – SECURE Water.) In passing the SWA, Congress found that adequate and safe supplies of water are fundamental to the health, economy, security and ecology of the United States, and that global climate change poses a significant challenge to the protection of these resources. The purpose of the Report is to assess risks to the water resources of the Western United States and develop strategies to mitigate risks to help ensure that the long-term water

<sup>1</sup> The report is available at <http://www.usbr.gov/climate/>.

resources management of the United States is sustainable. The Report is just the first in the series. Future reports will address climate change in greater detail.

The Report anticipates that temperatures will generally increase over time. Changes are projected to be perhaps slightly greater in the eastern portions of the San Joaquin River Basin. In the Basin, precipitation is projected to generally increase slightly during the early to mid-21st century (2020s and 2050s), but then decline slightly (2070s). The character of precipitation within the San Joaquin River Basin is also expected to change under warming conditions, resulting in more frequent rainfall events and less frequent snowfall events. Annual runoff should increase very slightly during the early and middle part of the 21<sup>st</sup> century, but then decline slightly starting by the mid-21<sup>st</sup> century. This change in the character and timing of precipitation will result in significant changes in the runoff patterns for the San Joaquin River Basin.

The Report predicts that, based upon current reservoir operational constraints (e.g., capacity, flood control rules), shifts in seasonal runoff will likely lead to reduced water supplies. With warming temperatures resulting in the need to release a greater fraction of runoff to maintain flood protection, and greater amounts of reservoir evaporation during warm months, meeting carryover storage goals will be increasingly challenging. The available cold water pool will decrease, even as the need to maintain a cold water reservoir increases, due to rising river water temperatures.

**Summary of simulated changes in decade-mean hydroclimate for the San Joaquin River basin:**

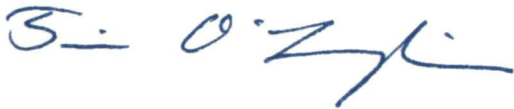
<b>Change from 1990s</b>	<b>2020s</b>	<b>2050s</b>	<b>2070s</b>
<b>San Joaquin River at Friant Dam</b>			
Mean Annual Temperature (°F)	+1.4	+3.3	+4.5
Mean Annual Precipitation (%)	-1.3	-5.3	-8.6
Mean April 1st Snow Water Equivalent (%)	-23.1	-39.6	-48.7
Mean Annual Runoff (%)	+0.7	-8.7	-10.7
Mean December–March Runoff (%)	+13.9	+15.8	+31
Mean April–July Runoff (%)	-6.1	-20.2	-25
Mean Annual Maximum Week Runoff (%)	-2.3	-6.6	-16
Mean Annual Minimum Week Runoff (%)	-4	-6.4	-7.6
<b>San Joaquin River at Vernalis</b>			
Mean Annual Temperature (°F)	+1.3	+3.1	+4.3
Mean Annual Precipitation (%)	-1	-4.2	-7.7
Mean April 1st Snow Water Equivalent (%)	-27.2	-45.9	-56.3
Mean Annual Runoff (%)	+0.8	-5.9	-8.4
Mean December–March Runoff (%)	+10.1	+10.7	+17.2
Mean April–July Runoff (%)	-4.8	-20.6	-25.8
Mean Annual Maximum Week Runoff (%)	1.6	-1.8	-4.9
Mean Annual Minimum Week Runoff (%)	-1.2	-1.9	-2.3



The Report further anticipates an array of interrelated and cascading impacts primarily associated with elevated air and water temperatures. Delta smelt will experience more days above temperatures, causing high mortality and a shift in thermal conditions for spawning to earlier in the year. Habitat could also improve for quagga mussels and other invasive species.

With the State Water Resources Control Board's ("SWRCB") focus on protecting fish and wildlife beneficial uses based on an unimpaired flow paradigm, climate change impacts must be addressed. The timing, magnitude, and temperature of unimpaired flow will change. The *Revised Notice of Preparation and Notice of Additional Scoping Meeting* ("Revised NOP"), issued April 1, 2011, included draft objectives for San Joaquin River flow based in part on "flows that mimic the natural hydrographic conditions to which native fish species are adapted, including the relative magnitude, duration, timing, and spatial extent of flows as they would naturally occur." However, climate change is changing the "natural" hydrograph. If flow objectives are to be based on "natural" unimpaired flow, the question then becomes whether objectives based on "natural" unimpaired flow can be implemented when unimpaired flow, the reference for the flow required at any given time, is no longer "natural." So far, these questions have not been addressed. They must be. With full implementation not anticipated in the Revised NOP's draft program of implementation until 2020, it is likely that flow objectives ultimately adopted by the SWRCB will be implemented, and will continue to be implemented, as the impacts of climate change become increasingly noticeable and significant.

Very truly yours,  
**O'LAUGHLIN & PARIS**



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TIM O'LAUGHLIN

TO/tb

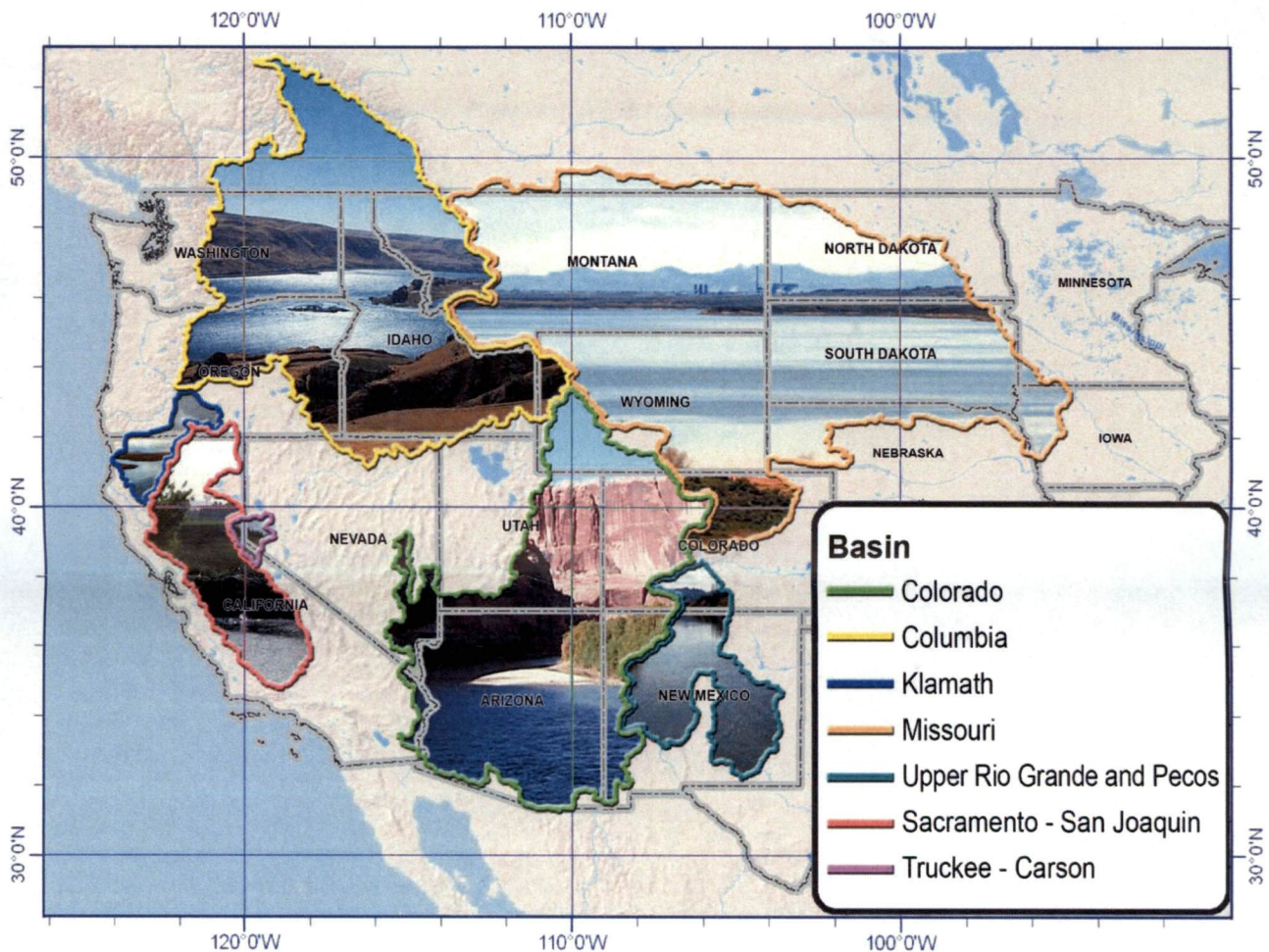
Attachment

cc: San Joaquin River Group Authority

# RECLAMATION

*Managing Water in the West*

## SECURE Water Act Section 9503(c) – Reclamation Climate Change and Water 2011



U.S. Department of the Interior  
Policy and Administration  
Bureau of Reclamation  
Denver, Colorado

April 2011